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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,522	01/27/2006	Yoshito Jin	96790P520	5835

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EXAMINER	
VALENTINE, JAMI M	

ART UNIT	PAPER NUMBER
2894	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,522	JIN ET AL.	
	Examiner	Art Unit	
	JAMI M. VALENTINE	2894	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-32* is/are pending in the application.

4a) Of the above claim(s) *23-32* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 9-22* is/are rejected.

7)☐ Claim(s) *4 and 6-8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/20/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of the Application

1. Acknowledgement is made of the amendment received 3/23/09. **Claims 1-4 and 6-32** are pending in this application. Claims 23-32 were previously withdrawn as being drawn to a nonelected invention. Claims 1, 3, 6, 11 were amended and claim 5 was cancelled in the amendment received 3/23/09.

Claim Objections

2. Claims 1 and 2 are objected to because of the following informalities: Claim 1 (line 8) and claim 2 each recite "the other surface of the first metal oxide layer", however, claim 1 was amended and no longer recites "the other surface" instead it now recites "another surface". Uniformity in language would aid clarity so that there would be no confusion as to whether the other surface is the same as another surface. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. The rejection under 35 U.S.C. 112, second paragraph has been withdrawn in light of the amendment received 3/23/09.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an

application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-3, 9-11 and 22** are rejected under 35 U.S.C. 102(e) as being anticipated by Bednorz et al. (US Patent Application Publication No 2005/0111256) hereinafter referred to as Bednorz.

7. Per **Claim 1** Bednorz (e.g. figure 3) discloses a bistable resistance value [0029] acquisition device, comprising

- a first metal oxide layer (18) containing at least two metals (e.g. $SrTiO_3$ [0041]) on a substrate (10) and having a thickness. (The recitation "predetermined" does not distinguish the claimed device over that of the applied prior art since any thickness is a predetermined thickness)
- a first electrode (12) on one surface of said first metal oxide layer;
- a second electrode (32) on another surface of said first metal oxide layer.
- an insulating layer (14) in contact with at least one of said one surface and said another surface of said first metal oxide layer, wherein the insulating layer (14) is between the first metal oxide layer (18) and the first electrode (12).

8. Per **Claim 2**, Bednorz discloses the device of claim 1 including a third electrode (20) which is formed on said another surface of said first metal oxide layer (18) while being spaced apart from said second electrode (as in figure 3).

9. Per **Claim 3**, Bednorz discloses (e.g. figure 3) the device of claim 2 including where the first electrode (12) is a gate electrode, the second electrode (32) is a source electrode and the third electrode (20) is a drain electrode [0006].

10. **Claims 9-11** each recite the performance properties of the device, i.e. the behavior of the metal oxide under supplied electrical signals and voltage. These functional limitations do not distinguish the claimed device over the prior art, since it appears that these limitations can be performed by the prior art structure of Bednorz. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re *Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-32 (Fed. Cir. 1997) See MPEP 2114.

11. Per **Claim 22**, Bednorz discloses the device of claim 1 including where the metal oxide is a ferroelectric. [0006]

Claim Rejections - 35 USC § 103

12. **Claims 12-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bednorz in view of Kijima et al. (US Patent No 5,811,181) hereinafter referred to as Kijima.

13. Per **Claim 12**, Bednorz disclose the device of claim 1 but fails to teach where the metal oxide comprises at least a base layer made of at least a first metal and oxygen, and a plurality of fine particles made of the first metal, a second metal, and oxygen and dispersed in said base layer

14. Kijima (e.g. figure 8A) teaches a ferroelectric material including a metal oxide that comprises at least a base layer made of at least a first metal and oxygen, and a plurality of fine particles made of the first metal, a second metal, and oxygen and dispersed in said base layer. Specifically, Kijima (column 11, lines 36-45) teaches "a structure in which fine crystal grains of $Bi_4Ti_3O_{12}$ are diffused into an amorphous titanium oxide medium."

15. All of the component parts are known in Bednorz and Kijima. The only difference is the combination of the old elements into a single device, by using the metal oxide materials of

Kijima in the device of Bednorz. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the metal oxide materials of Kijima in the device of Bednorz in order to achieve the predictable result of providing well known metal oxide materials for a ferroelectric device. Additionally, it would have been obvious to a person of ordinary skill in the art to try metal oxide materials of Kijima in an attempt to provide an improved ferroelectric device, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. *KSR International Co. v. Teleflex Inc.,* 550 U.S.--, 82 USPQ2d 1385 (2007).

16. Per **Claim 13**, Bednorz in view of Kijima disclose the device of claim 12, including where said base layer is made of the first metal, the second metal, and oxygen in which a content of the second metal is smaller in comparison with a stoichiometric composition. Specifically, the bismuth content is reduced from that of $Bi_4Ti_3O_1$. Kijima (column 11, lines 36-45)

17. Per **Claim 14**, Bednorz in view of Kijima disclose the device of claim 12, including where the base layer contains the first metal, the second metal, and crystals of oxygen Kijima (column 11, lines 36-45), but fails to teach where the crystals of oxygen are column crystals.

18. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use column crystals of oxygen, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for its intended use as a matter of design choice. *In re Leshin,* 125 USPQ 416.

19. Per **Claim 15**, Bednorz in view of Kijima disclose the device of claim 12, including where the metal oxide comprises a metal oxide monolayer in an amorphous state, in contact with

said base layer and made of at least the first metal and oxygen. Kijima teaches a titanium oxide buffer layer (column 9, lines 22-25).

20. Per **Claim 16**, Bednorz in view of Kijima disclose the device of claim 15, including where said metal oxide monolayer, a content of the second metal is smaller in comparison with a stoichiometric composition of the first metal, the second metal, and oxygen. Specifically, the bismuth content is reduced from that of $Bi_4Ti_3O_1$. Kijima (column 11, lines 36-45)

21. Per **Claim 17**, Bednorz in view of Kijima disclose the device of claim 15, including where said metal oxide monolayer does not contain the fine particles. Kijima teaches a titanium oxide buffer layer (column 9, lines 22-25).

22. Per **Claim 18**, Bednorz in view of Kijima disclose the device of claim 12, including where the first metal is titanium, the second metal is bismuth, and said base layer is in amorphous state and is formed from a layer containing titanium in an excessive amount relative to a stoichiometric composition. Specifically, the bismuth content is reduced from that of $Bi_4Ti_3O_1$. Kijima (column 11, lines 36-45)

23. Per **Claim 19**, Bednorz in view of Kijima disclose the device of claim 18, including where the first electrode is made of platinum and has a single-layer structure made of a single material (column 9 lines 11-12).

24. **Claims 20-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bednorz in view of Kaufman et al., US Patent No 7,099,141, hereinafter referred to as Kaufman.

25. Per **Claims 20-21**, Bednorz discloses the device of claim 1 including a substrate

26. Bednorz fails to teach where the substrate is made of a conductive material or where the electrode is identical to the substrate.

27. Kaufman teaches the use of a metallic substrate which is identical to the substrate (column 3 lines 19-21).

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the material for the electrode that is identical to the substrate , since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for its intended use as a matter of design choice. *In re Leshin,* 125 USPQ 416.

Allowable Subject Matter

29. Claims **4 and 6-8** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is an examiner's statement of reasons for allowance: Per claims 4 and 6, the key limitation is the limitation including a second metal oxide layer made of the same metal oxide and a fourth electrode and where the first electrode, first metal oxide layer, second metal oxide layer and the fourth electrode are connected in series in the stated order. Per claims 7 and 8 the key limitation is the limitation including an amorphous layer below a crystalline first electrode with the first metal oxide on the first electrode and the second electrode on the first metal oxide and an isolation layer made of the same metal oxide formed on the amorphous layer between the amorphous layer and the first elements (and an insulating layer between the first metal oxide layer and one of the first and second electrode as in claim 1). No prior art was found that taught these novel devices.

Response to Arguments

30. Applicant's arguments filed 3/23/09 have been fully considered but they are moot in view of the new ground(s) of rejection.

Cited Prior Art

31. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Each is cited as an example of materials and classes of materials with switchable electrostatic resistance and devices made from these materials

Reference 1: Beck et al.("Reproducible switching effect in thin oxide films for memory applications" Applied Physics Letters, Vol. 77, No. 1, July 2000, page 139)

Reference 2: Watanabe et al ("Current-driven insulator-conductor transition and nonvolatile memory in chromium-doped $SrTiO_3$ single crystals" Applied Physics Letters, Vol. 78, No. 23, June 2001 page 3738)

Reference 3: Rossel et al ("Electrical current distribution across a metal-insulator-metal structure during bistable switching", Journal of Applied Physics, Vol. 90, No. 6, September 2001, page 2892)

Conclusion

32. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMI M. VALENTINE whose telephone number is (571)272-9786. The examiner can normally be reached on Monday-Friday 9am-6pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly Nguyen can be reached on (571) 272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JMV/

/Bradley K Smith/
Primary Examiner, Art Unit 2894